A STUDY ON WATER QUALITY AT SUNGAI PANDAN

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STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

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ABSTRAK

Sungai mempunyai banyak kegunaan yang penting, adalah sangat penting untuk kualitinya dipantau dan dikaji secara berterusan. Justeru itu, objektif kajian ini adalah untuk menentukan Indeks Kualiti Air (WQI) Sungai Pandan berdasarkan enam parameter dalam skop Water Quality Index WQI, dan untuk melihat keberkesanan kaedah merawat air sungai dengan menggunakan dua jenis penggumpalan iaitu Aluminium Sulphat dan Iron Sulphate atau lebih dikenali sebagai Ferric Sulphate. Berdasarkan keputusan kajian, nilai WQI untuk Sungai Pandan adalah diantara 88.96 (hiliran) sehingga 97.62(hulu). Nilai ini diperoleh setelah mengambil kira sub-indeks enam parameter WQI iaitu Oksigen Terlarut (DO), Permintaan Oksigen Biokimia (BOD), Permintaan Oksigen Kimia (COD), Pepejal Terampai (TSS), Nitrogen Ammonia (AN) dan pH. Bagi penentuan klasifikasi Sungai Pandan, nilai WQI yang telah diperoleh menunjukkan Sungai Pandan berada di bawah Kelas I sehingga Kelas II. Untuk perbandingan kedua-dua penggumpalan, Aluminium Sulphate lebih bagus untuk penyingkiran kekeruhan and pepejal terampai. Peratus penyingkiran kekeruhan bagi Aluminium Sulphate di setiap stesen diantara 38.76% sehingga 60.98% manakala bagi Ferric Sulphate hanya diantara 21.14% sehingga 36.41% sahaja. Secara keseluruhan bagi penyingkiran kekeruhan dan pepejal terampai, Aluminium Sulphate lebih bagus berbanding Ferric Sulphate. Bagi penyingkiran pepejal terampai pula, untuk di setiap stesen peratus penyingkiran oleh Aluminium Sulphate adalah diantara 30.77% sehingga 48.48% dan ia adalah lebih tinggi berbanding Ferric Sulphate yang hanya diantara 12.5% sehingga 33.33% sahaja. Jelas kelihatan bahawa Aluminium Sulphate lebih bagus untuk menyingkirkan pepejal terampai berbanding Ferric Sulphate. Bagi penyingkiran logam-lagam berat, Ferric Sulphate lebih menyerlah berbanding Aluminium Sulphate. Untuk logam Copper, Aluminium Sulphate telah menyingkirkan peratus logam diantara 5.88% sehingga 25% sahaja disetiap stesen manakala Ferric Sulphate bermula dari 17.65% sehingga 33.33%. Untuk logam Chromium, Aluminium Sulphate menyingkirkan sebanyak 10.34% sehingga 29.63% manakala Ferric Sulphate dapat menyingkirkan sebanyak 11.11% sehingga 37.63%. Untuk logam Zinc, 3.57% sehingga 56.25% bagi Aluminium Sulphate manakala 6.06% sehingga 59.38% dapat disingkirkan oleh Ferric Sulphate. Jelas ternyata bagi penyingkiran logam-logam berat Ferric Sulphate lebih bagus berbanding Aluminium Sulphate.

ABSTRACT

The river has many important uses, it is very important for its quality to be monitored and reviewed continuously. Therefore, the objective of this study is to determine the Water Quality Index (WQI) of Sungai Pandan based on the six parameters in the scope of the WQI Water Quality Index, and to see the effectiveness of the river water treatment method using two types of coagulants Aluminium Sulphate and Iron Sulphate or better known as Ferric Sulphate. Based on the results of the study, the WQI value for Sungai Pandan is between 88.96 (downstream) up to 97.62 (upstream). This value was obtained after taking into account the six sub-indexes of the WQI parameters: Dilute Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Suspended Solids (TSS), Nitrogen Ammonia (AN) and pH. For the determination of the Pandan River classification, the WQI value has been shown to indicate that Pandan River is under Class I until Class II. For comparison of both coagulant, Aluminium Sulphate was better for removal of turbidity and suspended solids. The percentage of turbidity removal for Aluminium Sulphate at each station is between 38.76% and 60.98%, while for Ferric Sulphate is only between 21.14% and 36.41%. In general for the removal of turbidity and suspended solids, Aluminium Sulphate is better than Ferric Sulphate. For the removal of suspended solids, for each station the percentage of removal by Aluminium Sulphate is between 30.77% and 48.48% and it is higher than Ferric Sulphate which is only between 12.5% and 33.33%. It is clear that Aluminium Sulphate is better to remove suspended solids than Ferric Sulphate. For the removal of heavy metals, Ferric Sulphate is much superior to Aluminium Sulphate. For Copper, Aluminium Sulphate has removed metal percent between 5.88% and up to 25% at each station while Ferric Sulphate ranges from 17.65% to 33.33%. For Chromium metal, Aluminium Sulphate eliminates 10.34% up to 29.63% while Ferric Sulphate can get rid of 11.11% up to 37.63%. For Zinc metal, 3.57% to 56.25% for Aluminium Sulphate while 6.06% to 59.38% can be removed by Ferric Sulphate. Clearly, the removal of heavy metals Ferric Sulphate is better than Aluminium Sulphate.

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WQI	Water Quality Index
NQWS	National Quality Water Standard
DO	Dissolve Oxygen
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
AN	Ammonia Nitrogen
TSS	Total Suspended Solids
pH	Acidity/Alkalinity

CHAPTER 1

INTRODUCTION

1.1 Background study

'Water Planet' also other name for the Earth. By far most of water on the Earth surface is more than 96 percent, is saline water in the seas. The freshwater assets, for example, water tumbling from the skies and moving into streams, waterways, lakes, and groundwater, give individuals the water they require each day to live. Water sitting on the surface of the Earth is anything but difficult to imagine, and your perspective of the water cycle may be that precipitation tops off the waterways and lakes.

Surface water assets, for example, streams, lakes, repositories, estuaries, and beach front waters, are fundamental for sea-going biological communities, water supply, fisheries, and recreational and shipping exercises. For quite a long time, they have been viewed as the premise of improvement for urban zones, industry, and farming far and wide. Consequently, fitting preservation and the board of surface water assets is vital.

Waterways as a rule of a wide range of qualities to various individuals. For instance, waterways symbolize associations, since they contact everybody, and everyone on a fundamental level lives downstream. Streams additionally symbolize human well-being, since crisp water from waterways is fundamental to our networks and ourselves. Another esteem exemplified in a waterway is that of living space, featuring the significance of securing freshwater biological communities for fish and untamed life both in the stream, and along the river banks.

Deforestation in watershed area can prompt soil disintegration, which expands the danger of flooding and avalanches, and in addition making the soil unusable for farming or family unit purposes. Along a streams course, networks living along the river banks are in charge of an alternate arrangement of issues that further influence water quality and amount - over use, dumping of strong waste, depleting of sewage and dark water, and urban trash that dirties water run-off that streams into waterways. Ventures add to these issues by releasing waste water, synthetic compounds and so forth specifically into waterways, without being securely treated heretofore. At the point when dirtied waterways deplete into seas, the issues are intensified, contamination influences angle stocks, wrecks coral-reef living spaces that further exhausts angle stocks, and builds marine squanders, especially plastics, entering the natural way of life and in the end influencing human when animals devour the plastics. Waterways are in reality confronting various natural issues. This is in spite of the way that the greater part of consumable water for human utilization originates from waterways. In some outrageous cases, waterways, lakes and estuaries are unsatisfactory for such essential uses as angling and swimming.

Waterways convey water and supplements to regions all around the earth. Stream have a significant impact in the water cycle, going about as seepage channels for surface water. Rivers give fantastic environment and sustenance to a significant number of the world organisms. Many uncommon plants and trees develop by waterways. Ducks, voles, otters and beavers make a homes on the stream banks. Reeds and different plants like bulrushes develop along the stream banks. Other creatures utilize the waterway for sustenance and drink. Fowls, for example, kingfishers eat little fish from the waterway. In Africa, creatures, for example, elands, lions and elephants go to waterways for water to drink. Different creatures, for example, bears get fish from rivers. River deltas have various types of natural life. Creepy crawlies, warm blooded animals and feathered creatures utilize the delta for homes and for food. Rivers give venture out courses to investigation, business and recreation. River valleys and fields give ripe soils. Ranchers in dry locales inundate their cropland utilizing water conveyed by water system trench from adjacent rivers. Rivers are a significant vitality source. Amid the early mechanical period, plants, shops, and manufacturing plants were worked close quick streaming waterways where water could be utilized to control machines. Today steep waterways are as yet used to control hydroelectric plants and water turbines.

With an end goal to build up a framework to think about water quality in different parts of the nation, more than 100 water quality specialists were called upon to help make a standard Water Quality Index (WQI). The record is fundamentally a scientific method for ascertaining a solitary incentive from numerous test outcomes. The file result speaks to the dimension of water quality in a given water bowl, for example, a lake, waterway, or stream. The important is imperative to screen water quality over some undefined time frame so as to distinguish changes in the water biological system. The Water Quality Index, which was produced in the mid-1970s, can give a sign of the soundness of the watershed at different indicates and can be utilized monitor and examine changes after some time. The WQI can be utilized to screen water quality changes in a specific water supply after some time, or WQI very well may be utilized to contrast a water supply quality and other water supplies in the locale or from around the globe.

The Water Quality Index utilizes a scale from 0 to 100 to rate the nature of the water, with 100 being the most noteworthy conceivable score. When the general WQI score is known, WQI very well may be contrasted against the accompanying scale with decide how solid the water is on a given day.

Table 1.1 National Water Quality Standards (NWQS) Malaysia

Parameter	**Unit**	**Class I**	**Class II**	**Class III**	**Class IV**	**Class V**
Nitrogen Ammonia	mg/L	<0.1	0.1-0.3	0.3-0.9	0.9-2.7	>2.7
Biochemical Oxgen Demand	mg/L	<1	1-3	3-6	6-12	>12
Chemical Oxygen Demand	mg/L	<10	10-25	25-50	50-100	>100
Dissolved Oxygen	mg/L	>7	5-7	3-5	1-3	<1
pH	-	>7	6-7	5-6	<5	>5
Suspended solids	mg/L	<25	25-50	50-150	150-300	>300
Water Quality Index	-	<92.5	76.5-92.7	51.9-76.5	31.0-51.9	>31.0

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